

CLAIMS:

1. A Ziegler-Natta catalyst precursor composition comprising the spray-dried reaction product of a magnesium compound, a non-metallocene titanium compound, and at least one non-metallocene compound of a transition metal other than titanium.

5 2. The precursor composition of claim 1 additionally comprising a filler.

3. The precursor composition of claim 2 wherein the filler is silica..

4. A process for preparing a Ziegler-Natta precursor composition comprising forming a solution of a magnesium, titanium and transition metal compound in a primary diluent and spray drying the liquid composition to form solid particles of the precursor composition.

10 5. The process of claim 4 wherein the primary diluent comprises an organic compound containing hydroxyl functionality, ether functionality, or a mixture of hydroxyl and ether functionality.

6. A process for conversion of a catalyst precursor composition into a procatalyst composition for use in Ziegler-Natta polymerization processes comprising halogenating a precursor composition according to claim 1.

7. A process according to claim 6 wherein the halogenating agent comprises an organoaluminum halide halogenating agent, an organoboron halide halogenating agent, or a mixture thereof.

8. A catalyst composition comprising a solid mixture formed by halogenation of:

20 A1) a spray-dried catalyst precursor comprising the reaction product of a magnesium compound, a non-metallocene titanium compound, and at least one non-metallocene compound of a transition metal other than titanium, with

A2) a halogenating agent comprising an organoaluminium halide, and organoboron halide, or a mixture thereof.

25 9. The catalyst composition of claim 8 wherein the spray dried catalyst precursor further comprises at least one filler.

10. The catalyst composition of claim 8 wherein the filler is surface modified fumed silica.

30 11. The catalyst composition of claim 8 wherein the precursor comprises magnesium, titanium, and hafnium.

12. The catalyst composition of claim 8 wherein the molar ratio Mg/Ti/Hf in the catalyst precursor is $x/1/y$, where x is a number from 2 to 10, and y is a number from greater than 0 to 10.

35 13. The catalyst composition of claim 8 wherein the halogenating agent comprises ethylaluminum sesquichloride.

14. A process for forming a Ziegler-Natta catalyst composition according to claim 8 comprising halogenating:

A1) a spray-dried catalyst precursor comprising the reaction product of a magnesium compound, a non-metallocene titanium compound, and at least one non-metallocene compound of a transition metal other than titanium, with

A2) a halogenating agent comprising an organoaluminium halide, an organoboron halide or a mixture thereof.

15. An olefin polymerization process comprising contacting one or more C₂₋₂₀ olefins under polymerization conditions with a catalyst composition according to any of claims 8-13 or prepared according to the process of claim 14 and an organoaluminum activating cocatalyst.

16. A process according to claim 15 wherein the cocatalyst is triethylaluminum.